

*PIERIS CASTORIA* REAKIRT, 1867 (INSECTA, LEPIDOPTERA,  
PROPOSED SUPPRESSION UNDER THE PLENARY POWERS. Z.N.(S.)2170

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Recent biological investigations have indicated that Californian populations of the *Pieris napi* Linnaeus, 1758 complex (Insecta, Lepidoptera, PIERIDAE) are differentiated into two subspecies: a coastal, bivoltine, seasonally diphenic one for which the oldest valid name is *Pieris venosa* Scudder, 1861 and an interior, univoltine, monophenic one whose name is at issue in this petition. The oldest unambiguous name for this subspecies, and the one in current use, is *Pieris napi microstriata* J.A. Comstock, 1925. Evidence is presented which suggests that the name *Pieris castoria* Reakirt, 1867, which has been used almost exclusively as an infrasubspecific "form" name (as a junior subjective synonym of *Pieris venosa*) for 99 years, is applicable to the interior subspecies. Since transferring the name *castoria* to the interior subspecies would cause intolerable confusion, the International Commission on Zoological Nomenclature is asked to suppress it under the Plenary Powers, an action which would preserve current usage.

2. Reakirt, (1867, p. 238) described *Pieris castoria*, apparently on the basis of a male received from Lorquin (Brown, 1964, p. 212 and *in litt.*). The description is brief but adequate for recognition. It is reproduced below as its wording is vital to the matter at issue:

2. *PIERIS CASTORIA*, nov. sp.

Size and form of *Pieris oleracea*, Harris.

*Male*, upper side pure white, inner half of costa of primaries, and base of both wings, strewn with a few dark atoms; a rounded black spot in the medio-superior interspace of the fore wings, situate as in the preceding species; no other markings; fringes white, expanse 2-2.12 inches.

Underneath immaculate white; a faint yellowish tinge on the apex of the primaries, and along the costa of the secondaries.

Body black, with whitish hairs below; antennae black, with incomplete white annulations interrupted above. Club yellowish, or yellowish brown at tip.

*Hab* — California. Coll. Tryon Reakirt.

3. Scudder (1861, p. 182) described *Pieris venosa* from San Mateo and Mendocino city, California, both coastal localities in the summer-fog belt. The description is unambiguously of the first-brood phenotype of coastal populations, characterized by heavy black veining on the ventral hindwing and apex of forewing. This is the oldest valid name for any coastal Californian population of the *Pieris napi* complex.

4. Strecker (1877, p. 62) first suggested that *castoria* might be the second-brood phenotype of *venosa*, by analogy to *napaeae* Esper in Europe. W.H. Edwards (1881, p. 94) in a review of the complex world-wide, echoed the same idea. The name *castoria* has been used in this sense by most of the subsequent major writers on Californian butterflies: Comstock, 1927; Tilden, 1941; Tilden, 1965; Opler and Langston, 1968; Warren, 1968; and Howe, 1975, are examples. In a work notorious for its errors, Wright (1906) figured three typical *venosa* as "*castoria*", a usage followed by a few writers in the next five years, relying on Wright's book (Coolidge, 1908; Coolidge and Newcomer, 1908; Williams, 1910). Tilden (1975) corrected this and many other misdeterminations by Wright. Since *venosa* is six years older than *castoria* and the specimens figured by Wright look nothing like Reakirt's description of *castoria*, there is no rationale for this benighted use as a "senior synonym". The next use of *castoria* was by Seitz (1924), who listed it as a variety of *napi* found in California, but also listed *venosa* as a separate species, also from California (pp. 59-60)! Holland (1932) ignored the California taxa altogether. Langston (1975) suggested (pp. 85-86) on phenological grounds that *castoria* might be a distinct species - a suggestion disproved experimentally by Shapiro (1975). Thus, since 1877 the name *castoria* has been generally identified as a junior subjective synonym of *venosa* and used informally as a seasonal "form" name for the second brood in *venosa* populations; throughout this period it has never been used as a senior synonym nor applied in any sense other than Strecker's, except for the misdetermination by Wright.

5. J.A. Comstock (1925, p. 125) described *Pieris napi microstriata* from Eldredge, Sonoma County, inland from the fog belt in a locality where the population is normally univoltine and monophenic. Aside from Comstock's (1927) book, this name received virtually no use since the validity of a subspecific distinction was not generally recognized. C. dos Passos (1964) treated *microstriata* as a junior subjective synonym of *venosa*. Garth and Tilden (1963) noted that Sierran *napi* were more lightly marked than typical *venosa*, but failed to connect them to Comstock's name and concluded that no subspecies name was available for them. When the magnitude of the biological differences between coastal and interior California *P. napi* became apparent, I resurrected *microstriata* (Shapiro, 1975; 1976a, b) as the oldest name for the latter. At that time I (like everyone else) was unaware that the name *Pieris castoria* might have any application other than the established usage (i.e., that of Strecker 1877). Thus the name *microstriata* has not received sufficient use to constitute a *prima facie* case

that de-stabilization of nomenclature would occur were it superseded by an unused senior synonym (Article 79).

6. Wild second-brood *Pieris napi venosa* almost never match Reakirt's description of *castoria*. They differ consistently in having more or less black pattern on the veins of the hindwing ventrally and at the dorsal forewing apex. Langston (*in litt.*) reports that in twenty years of collecting in northern and central California he has taken only one second-brood *napi* matching Reakirt's description, a single male in Contra Costa County at an *Inner* Coast Range locality out of the fog belt, i.e. in *microstriata* habitat. James Bruce Walsh, who has studied in detail the phenology of *P. n. venosa* in Monterey County, reports (*pers. comm.*) that he has never seen a specimen there matching Reakirt's description. There are no such specimens in the collections of the University of California at Berkeley and Davis or in the California Academy of Sciences. The Natural History Museum of Los Angeles County contains several. Among these are two labelled "Oakland / May 8, 1930" and two labelled "Bear Valley, Marin Co. / April 15, 1931" which are pinned from a Riker mount and which I judge to be mislabelled. Accurately labelled specimens matching Reakirt's description in pattern (but not in size) are from Mill Valley and Bear Valley, both Marin County.

7. Both coastal and interior *Pieris napi*, when reared under environmental conditions which inhibit pupal diapause, give rise to a second brood which is more lightly marked than the first. Coastal (*venosa*) stocks produce their usual second-brood phenotype under these conditions with fewer than 10% of reared males matching Reakirt's description. Interior (*microstriata*) stocks produce a more lightly-marked second-brood phenotype which matches Reakirt's description in 75-100% of males. Could Reakirt's type have been from an interior rather than a coastal population? (See Shapiro, 1975, 1976a).

8. Wild second-brood specimens occur very sporadically in interior (*microstriata*) populations, most frequently in the Coast Ranges and around the Napa Valley in areas subject to some maritime influence in summer, and mostly in cool, wet years. Most California collectors have never seen one. Populations in these localities are transitional from *venosa* to *microstriata*, and show the greatest phenotypic variability under our experimental regimes (Shapiro, unpublished data). Second-brood Sierra Nevada specimens are essentially unknown. No wild-collected ones exist in any of the institutional collections cited under (6) above. A partial second brood, males of which match perfectly Reakirt's description and our reared material, is produced fairly regularly in two cool, moist box canyons in the American River gorge below Auburn, Placer County (180m) (Shapiro 1976a). At Lang Crossing in the Yuba River gorge, Nevada County (1365m) I have taken one male of the same phenotype. Despite enquiries to experienced Sierran collectors, I have found no other records.

9. The putative syntypes of *castoria* are in the Strecker collection at the Field Museum of Natural History in Chicago. Strecker, in his MS catalogue of his collection, identified "specimen a" as the model of his figure 4 (Strecker 1877, plate viii) and the "type" of *castoria*. This individual, bearing a label "Orig. Type/Coll. Reak." in Strecker's handwriting, and matching closely the figure cited, was examined and photographed for me by Lee D. Miller and F. Martin Brown in 1975. It differs from Reakirt's description in having dark scaling along the vein tips of the forewing both dorsally and ventrally and along the veins of the hindwing ventrally. All of these are ruled out by Reakirt's assertion: "no other markings". The specimen, which must be considered a pseudotype, is an "average" second-brood coastal specimen (e.g. from San Mateo or Marin Counties) and conforms to the usage which dates from Strecker. At my request Brown examined all other *Pieris napi* in the Strecker collection; none matches the description well enough to qualify as lectotype of *castoria*. Reakirt's original specimen must be assumed lost, perhaps even before his collection passed into Strecker's hands.

10. There is little information available on Lorquin's travels to help us decide where he collected the type of *castoria*. F.M. Brown, who is trying to reconstruct his itineraries, advises me *in litt.*: "By the 1860s he had travelled in the interior of northern California, but little or no collecting on the northern coast." Boisdual (1868) sketches Lorquin's travels; he says that prior to 1857 Lorquin had explored "tous les environs de San Francisco, puis les bords du Sacramento et de la Plume ... dans la chaîne de la Sierra-Nevada ... jusque dans les forêts de l'intérieur". This includes both *venosa* and *microstriata* habitats.

11. According to Gudde (1969, p.115), a town called Castoria existed in California from 1850 to 1859, precisely when Lorquin was collecting. This place is now French Camp, San Joaquin County. The site had been the headquarters of French beaver trappers on the San Joaquin River and its tributaries, hence both names. Given Lorquin's nationality it seems likely that he would have made it a point to visit there, perhaps regularly. In the same paper in which he describes *castoria*, Reakirt (1867, p. 238) also names *Pieris yreka*. Yreka, Siskyou County, was named in 1852 (Gudde 1969, p. 371). These towns can thus be inferred to be the localities of Lorquin's specimens, subsequently Reakirt's types. Castoria = French Camp is on the floor of the San Joaquin Valley at an elevation of less than 3m. In Lorquin's day it lay in a region of marshland and dense riparian cottonwood-willow-alder forest, now largely eradicated. *Pieris napi* ssp. occur today in riparian habitats in canyons in both the Coast Ranges and Sierra Nevada, but not on the floor of the Sacramento - San Joaquin Valley. Reconnaissance of riparian habitats in 1972 through 1976 has failed to turn up any *Pieris napi* anywhere on the Valley floor. I judge it impossible to obtain strictly topotypical material for a neotype designation. If Lorquin used "Castoria" loosely to refer to a large area around the camp, foothill populations may be extant.



12. Populations in the foothills both east and west of Castoria = French Camp would be expected to be univoltine, monophenic *microstriata* like other known ones; on climatic grounds it thus seems safe to assume that the postulated, presumably extinct Valley animals were also of this subspecies. The probability of producing a second brood may have been distorted by the unusual weather which obtained in central California during Lorquin's sojourn. Moist years favour second-brood emergences, and the water years 1852/53, 1859/60, 1861/62, 1864/65 and 1866/67 all saw more than 110% of mean annual rainfall (based on 1849-1969) at Sacramento, with 200% in the great flood year of 1861/62.

13. Based on the inferred type locality, *castoria* is the oldest name applicable to the interior subspecies, antedating *microstriata* by 58 years. Ordinarily the failure of the latter name to qualify for conservation under Article 79 would end the matter here. However, the apparently erroneous usage of *castoria* dating from Strecker, 1877, documented in paragraph (4) above, is so well established that were it upset, great confusion would result — it has been used with complete consistency for well over 50 years. In addition, there are three complicating circumstances arguing against transferring the name *castoria* to the interior subspecies: (i) the subspecies would be based on a phenotype almost never produced in nature and unknown to collectors familiar with the populations; (ii) the applicability of the name to the subspecies, as noted in paragraphs 11 and 12 above, is based on inferences about an apparently extinct, hence unverifiable, population; and (iii) the type-locality would have to be interpreted very broadly to obtain a neotype to fix the usage. We do not know whether *napi* populations exist at all in the closest foothills of either range, and as noted in (8) second-brood specimens of interior populations are altogether very rare so that it might require many years' surveillance before a single one is taken in any nearby population!

14. Two major volumes on California butterflies are in preparation, and it is thus desirable to fix the nomenclature of these entities at this time. Moreover, studies in our laboratory indicate that the *Pieris napi* complex is important in paleoclimatological and biogeographic inference, and its subspecific nomenclature is thus likely to appear with increasing frequency in the literature of those disciplines. The taxonomy of the entire complex world-wide is in flux as a result of radical proposals advanced by B.C.S. Warren in several publications. Although Warren's work does not touch on the present problem directly, it increases the likelihood of a global revision of the complex in the near future. The biological problems presented in this petition, bearing on the identities of the California taxa, would not be known by a reviser based anywhere else, particularly if working only with museum material.

15. If the Commission elects to suppress the name *Pieris castoria*, that name may still be used informally, infrasubspecifically for the second-brood phenotype of *Pieris napi venosa* as it has been for 99 years. As the

conspecificity of all the entities involved (*venosa*, *castoria*, and *microstriata*) is established beyond question in our experiments (Shapiro, 1975, 1976a, b and unpublished) there is no possible loss to future revisers if this name is formally invalidated.

16. An alternative approach would be to designate as neotype of *castoria* one of the few known second-brood coastal (*venosa*) males which matches the original description, thus attaching the name to the organism for which it is commonly used. As noted in paragraphs 11 and 12 above, the type locality of *castoria* is apparently not in *venosa* territory at all; thus such an action would violate Article 75 and would require an action by the Commission under the Plenary Powers. In my opinion the proposed suppression of *castoria* is the preferable alternative since it is consistent with the Code, but the Commission can of course opt for an irregular neotype designation at its discretion, and a suitable specimen from the Natural History Museum of Los Angeles County is available.

17. Therefore, in the interest of stability and uniformity in butterfly nomenclature, I hereby request that the International Commission on Zoological Nomenclature (i) apply its plenary powers to suppress the name *castoria*, as published in the binomen *Pieris castoria* Reakirt, 1867 for purposes of the Law of Priority but not for those of the Law of Homonymy, and to place it on the Official Index of Rejected and Invalid Specific Names in Zoology; and (ii) place the name *microstriata*, published as *Pieris napi microstriata* Comstock, 1925, on the Official List of Specific Names in Zoology.

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